

$K_2^*(1430)$ $I(J^P) = \frac{1}{2}(2^+)$

We consider that phase-shift analyses provide more reliable determinations of the mass and width.

 $K_2^*(1430)$ MASS**CHARGED ONLY, WITH FINAL STATE $K\pi$**

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
1425.6 ± 1.5 OUR AVERAGE	Error includes scale factor of 1.1.				
1420 \pm 4	1587	BAUBILLIER	84B	HBC	$- 8.25 K^- p \rightarrow \bar{K}^0 \pi^- p$
1436 \pm 5.5	400	1,2 CLELAND	82	SPEC	$+ 30 K^+ p \rightarrow K_S^0 \pi^+ p$
1430 \pm 3.2	1500	1,2 CLELAND	82	SPEC	$+ 50 K^+ p \rightarrow K_S^0 \pi^+ p$
1430 \pm 3.2	1200	1,2 CLELAND	82	SPEC	$- 50 K^+ p \rightarrow K_S^0 \pi^- p$
1423 \pm 5	935	TOAFF	81	HBC	$- 6.5 K^- p \rightarrow \bar{K}^0 \pi^- p$
		3 MARTIN	78	SPEC	$+ 10 K^\pm p \rightarrow K_S^0 \pi p$
		3 MARTIN	78	SPEC	$- 10 K^\pm p \rightarrow K_S^0 \pi p$
1420.0 \pm 3.1	1400	AGUILAR...	71B	HBC	$- 3.9, 4.6 K^- p$
1425 \pm 8.0	225	1,2 BARNHAM	71C	HBC	$+ K^+ p \rightarrow K^0 \pi^+ p$
1416 \pm 10	220	CRENNELL	69D	DBC	$- 3.9 \bar{K}^- N \rightarrow \bar{K}^0 \pi^- N$
1414 \pm 13.0	60	1 LIND	69	HBC	$+ 9 K^+ p \rightarrow K^0 \pi^+ p$
1427 \pm 12	63	1 SCHWEING...	68	HBC	$- 5.5 K^- p \rightarrow \bar{K}\pi N$
1423 \pm 11.0	39	1 BASSANO	67	HBC	$- 4.6-5.0 K^- p \rightarrow \bar{K}^0 \pi^- p$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1423.4 \pm 2 \pm 3	24809 \pm 820	4 BIRD	89	LASS	$- 11 K^- p \rightarrow \bar{K}^0 \pi^- p$
------------------------	-----------------	--------	----	------	--

NEUTRAL ONLY

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
1432.4 ± 1.3 OUR AVERAGE					
1431.2 \pm 1.8 \pm 0.7		5 ASTON	88	LASS	$0 11 K^- p \rightarrow \bar{K}^- \pi^+ n$
1434 \pm 4 \pm 6		5 ASTON	87	LASS	$0 11 K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
1433 \pm 6 \pm 10		5 ASTON	84B	LASS	$0 11 K^- p \rightarrow \bar{K}^0 2\pi n$
1471 \pm 12		5 BAUBILLIER	82B	HBC	$0 8.25 K^- p \rightarrow N K_S^0 \pi\pi$
1428 \pm 3		5 ASTON	81C	LASS	$0 11 K^- p \rightarrow \bar{K}^- \pi^+ n$
1434 \pm 2		5 ESTABROOKS	78	ASPK	$0 13 K^\pm p \rightarrow p K\pi$
1440 \pm 10		5 BOWLER	77	DBC	$0 5.5 K^+ d \rightarrow K\pi pp$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1420	\pm 7	300	HENDRICK	76	DBC	8.25 $K^+ N \rightarrow K^+ \pi N$
1421.6	\pm 4.2	800	MCCUBBIN	75	HBC	0 3.6 $K^- p \rightarrow K^- \pi^+ n$
1420.1	\pm 4.3		⁶ LINGLIN	73	HBC	0 2-13 $K^+ p \rightarrow K^+ \pi^- X$
1419.1	\pm 3.7	1800	AGUILAR...	71B	HBC	0 3.9,4.6 $K^- p$
1416	\pm 6	600	CORDS	71	DBC	0 9 $K^+ n \rightarrow K^+ \pi^- p$
1421.1	\pm 2.6	2200	DAVIS	69	HBC	0 12 $K^+ p \rightarrow K^+ \pi^- X$

¹ Errors enlarged by us to Γ/\sqrt{N} ; see the note with the $K^*(892)$ mass.

² Number of events in peak re-evaluated by us.

³ Systematic error added by us.

⁴ From a partial wave amplitude analysis.

⁵ From phase shift or partial-wave analysis.

⁶ From pole extrapolation, using world $K^+ p$ data summary tape.

$K_2^*(1430)$ WIDTH

CHARGED ONLY, WITH FINAL STATE $K\pi$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
98.5 \pm 2.7 OUR FIT	Error includes scale factor of 1.1.				
98.5 \pm 2.9 OUR AVERAGE	Error includes scale factor of 1.1.				
109 \pm 22	400	7,8 CLELAND	82	SPEC +	30 $K^+ p \rightarrow K_S^0 \pi^+ p$
124 \pm 12.8	1500	7,8 CLELAND	82	SPEC +	50 $K^+ p \rightarrow K_S^0 \pi^+ p$
113 \pm 12.8	1200	7,8 CLELAND	82	SPEC -	50 $K^+ p \rightarrow K_S^0 \pi^- p$
85 \pm 16	935	TOAFF	81	HBC -	6.5 $K^- p \rightarrow \bar{K}^0 \pi^- p$
96.5 \pm 3.8		MARTIN	78	SPEC +	10 $K^\pm p \rightarrow K_S^0 \pi p$
97.7 \pm 4.0		MARTIN	78	SPEC -	10 $K^\pm p \rightarrow K_S^0 \pi p$
94.7 $^{+15.1}_{-12.5}$	1400	AGUILAR...	71B	HBC -	3.9,4.6 $K^- p$

• • • We do not use the following data for averages, fits, limits, etc. • • •

98 \pm 4 \pm 4	24809 \pm 820	⁹ BIRD	89	LASS -	11 $K^- p \rightarrow \bar{K}^0 \pi^- p$
--------------------	-----------------	-------------------	----	--------	--

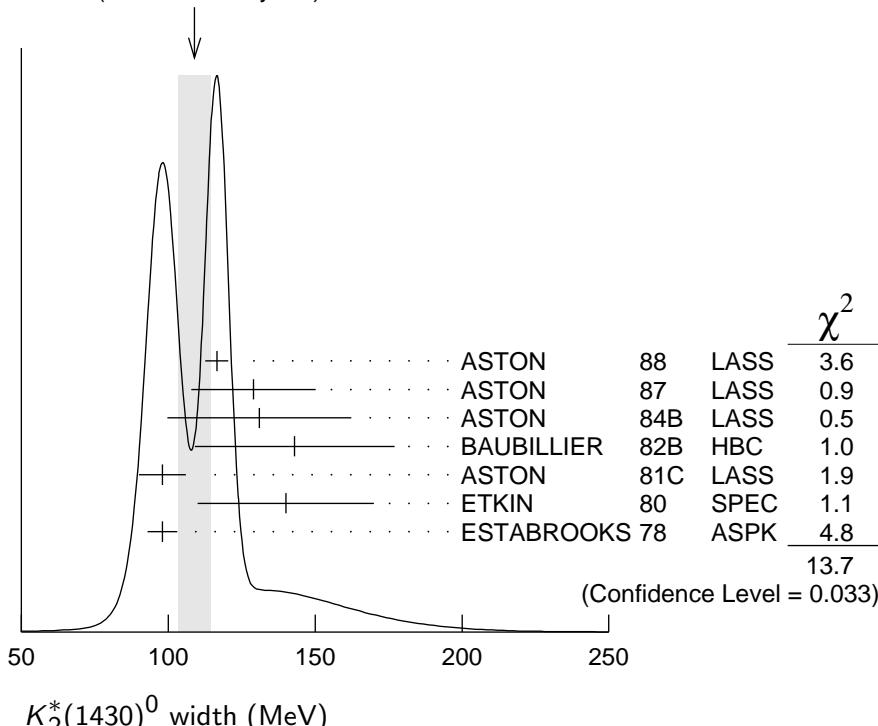
NEUTRAL ONLY

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
109 \pm 5 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.				
116.5 \pm 3.6 \pm 1.7		10 ASTON	88	LASS 0	11 $K^- p \rightarrow K^- \pi^+ n$
129 \pm 15 \pm 15		10 ASTON	87	LASS 0	11 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
131 \pm 24 \pm 20		10 ASTON	84B	LASS 0	11 $K^- p \rightarrow \bar{K}^0 2\pi n$
143 \pm 34		10 BAUBILLIER	82B	HBC 0	8.25 $K^- p \rightarrow NK_S^0 \pi\pi$
98 \pm 8		10 ASTON	81C	LASS 0	11 $K^- p \rightarrow K^- \pi^+ n$
140 \pm 30		10 ETKIN	80	SPEC 0	6 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
98 \pm 5		10 ESTABROOKS	78	ASPK 0	13 $K^\pm p \rightarrow p K\pi$

• • • We do not use the following data for averages, fits, limits, etc. • • •

125	± 29	300	⁷ HENDRICK	76	DBC	8.25	$K^+ N \rightarrow K^+ \pi N$
116	± 18	800	MCCUBBIN	75	HBC	0	$3.6 K^- p \rightarrow K^- \pi^+ n$
61	± 14		¹¹ LINGLIN	73	HBC	0	2-13 $K^+ p \rightarrow K^+ \pi^- X$
$116.6^{+10.3}_{-15.5}$		1800	AGUILAR...	71B	HBC	0	3.9,4.6 $K^- p$
144	± 24.0	600	⁷ CORDS	71	DBC	0	$9 K^+ n \rightarrow K^+ \pi^- p$
101	± 10	2200	DAVIS	69	HBC	0	$12 K^+ p \rightarrow K^+ \pi^- \pi^+ p$

WEIGHTED AVERAGE
109 \pm 5 (Error scaled by 1.9)



$K_2^*(1430)^0$ width (MeV)

⁷ Errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.

⁸ Number of events in peak re-evaluated by us.

⁹ From a partial wave amplitude analysis.

¹⁰ From phase shift or partial-wave analysis.

¹¹ From pole extrapolation, using world $K^+ p$ data summary tape.

$K_2^*(1430)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1 $K\pi$	(49.9 \pm 1.2) %	
Γ_2 $K^*(892)\pi$	(24.7 \pm 1.5) %	
Γ_3 $K^*(892)\pi\pi$	(13.4 \pm 2.2) %	
Γ_4 $K\rho$	(8.7 \pm 0.8) %	S=1.2

Γ_5	$K\omega$	(2.9 ± 0.8) %		
Γ_6	$K^+\gamma$	(2.4 ± 0.5) $\times 10^{-3}$	S=1.1	
Γ_7	$K\eta$	($1.5^{+3.4}_{-1.0}$) $\times 10^{-3}$	S=1.3	
Γ_8	$K\omega\pi$	< 7.2 $\times 10^{-4}$	CL=95%	
Γ_9	$K^0\gamma$	< 9 $\times 10^{-4}$	CL=90%	

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, and 10 branching ratios uses 31 measurements and one constraint to determine 8 parameters. The overall fit has a $\chi^2 = 20.2$ for 24 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta p_i \delta p_j \rangle / (\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i , including the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_2	x_3	x_4	x_5	x_6	x_7	Γ
	x_1	x_2	x_3	x_4	x_5	x_6	x_7
x_2	-9						
x_3	-40	-73					
x_4	-8	36	-52				
x_5	-11	-3	-26	-7			
x_6	-1	-1	-1	-1	0		
x_7	-4	-7	-5	-5	-2	0	
Γ	0	0	0	0	0	-13	0

	Mode	Rate (MeV)	Scale factor
Γ_1	$K\pi$	49.1 ± 1.8	
Γ_2	$K^*(892)\pi$	24.3 ± 1.6	
Γ_3	$K^*(892)\pi\pi$	13.2 ± 2.2	
Γ_4	$K\rho$	8.5 ± 0.8	1.2
Γ_5	$K\omega$	2.9 ± 0.8	
Γ_6	$K^+\gamma$	0.24 ± 0.05	1.1
Γ_7	$K\eta$	$0.15^{+0.33}_{-0.10}$	1.3

$K_2^*(1430)$ PARTIAL WIDTHS

$\Gamma(K^+\gamma)$		Γ_6
<u>VALUE (keV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
241±50 OUR FIT	Error includes scale factor of 1.1.	<u>CHG</u>
240±45	CIHANGIR 82 SPEC	+ 200 $K^+Z \rightarrow ZK^+\pi^0$, $ZK_S^0\pi^+$

$\Gamma(K^0\gamma)$	Γ_9				
<u>VALUE (keV)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
< 5.4	90	ALAVI-HARATI02B	KTEV		$K + A \rightarrow K^* + A$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
<84	90	CARLSMITH	87	SPEC 0	60–200 $K_L^0 A \rightarrow K_S^0 \pi^0 A$

$K_2^*(1430)$ BRANCHING RATIOS

$\Gamma(K\pi)/\Gamma_{\text{total}}$	Γ_1/Γ			
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
0.499±0.012 OUR FIT				
0.488±0.014 OUR AVERAGE				
0.485±0.006±0.020	12 ASTON	88	LASS 0	11 $K^- p \rightarrow K^- \pi^+ n$
0.49 ± 0.02	12 ESTABROOKS	78	ASPK ±	13 $K^\pm p \rightarrow p K\pi$

$\Gamma(K^*(892)\pi)/\Gamma(K\pi)$	Γ_2/Γ_1			
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
0.496±0.034 OUR FIT				
0.47 ± 0.04 OUR AVERAGE				
0.44 ± 0.09	ASTON	84B	LASS 0	11 $K^- p \rightarrow \bar{K}^0 2\pi n$
0.62 ± 0.19	LAUSCHER	75	HBC 0	10,16 $K^- p \rightarrow K^- \pi^+ n$
0.54 ± 0.16	DEHM	74	DBC 0	4.6 $K^+ N$
0.47 ± 0.08	AGUILAR-...	71B	HBC	3.9,4.6 $K^- p$
0.47 ± 0.10	BASSANO	67	HBC –0	4.6,5.0 $K^- p$
0.45 ± 0.13	BADIER	65C	HBC –	3 $K^- p$

$\Gamma(K\omega)/\Gamma(K\pi)$	Γ_5/Γ_1			
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
0.059±0.017 OUR FIT				
0.070±0.035 OUR AVERAGE				
0.05 ± 0.04	AGUILAR-...	71B	HBC	3.9,4.6 $K^- p$
0.13 ± 0.07	BASSOMPIE...	69	HBC 0	5 $K^+ p$

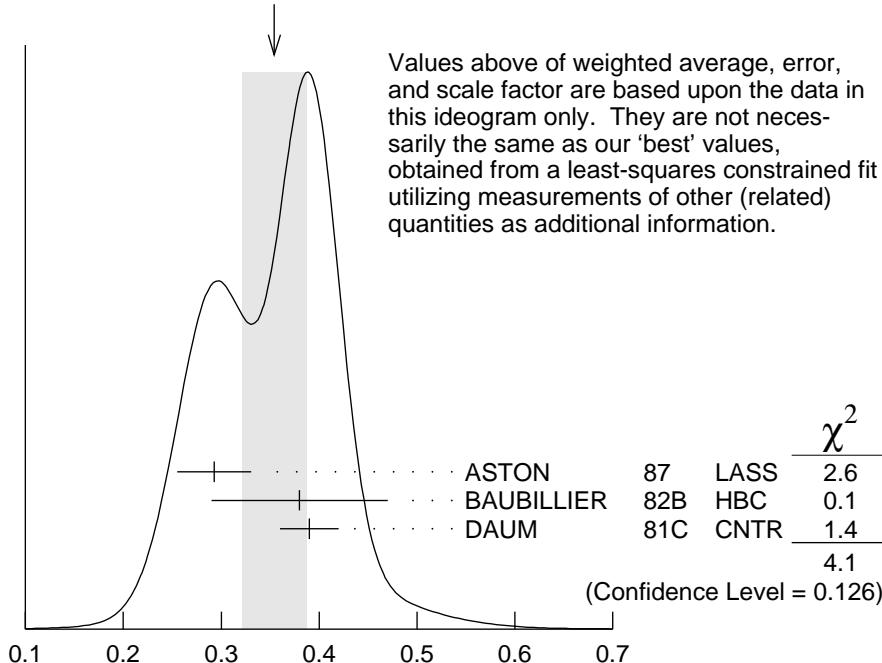
$\Gamma(K\rho)/\Gamma(K\pi)$	Γ_4/Γ_1			
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
0.174±0.017 OUR FIT				
Error includes scale factor of 1.2.				
0.150^{+0.029}_{-0.017} OUR AVERAGE				
0.18 ± 0.05	ASTON	84B	LASS 0	11 $K^- p \rightarrow \bar{K}^0 2\pi n$
0.02 ^{+0.10} _{-0.02}	DEHM	74	DBC 0	4.6 $K^+ N$
0.16 ± 0.05	AGUILAR-...	71B	HBC	3.9,4.6 $K^- p$
0.14 ± 0.10	BASSANO	67	HBC –0	4.6,5.0 $K^- p$
0.14 ± 0.07	BADIER	65C	HBC –	3 $K^- p$

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$

Γ_4/Γ_2

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.350±0.031 OUR FIT	Error includes scale factor of 1.4.			
0.354±0.033 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.			
0.293±0.032±0.020	ASTON	87	LASS	0 $11 K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
0.38 ± 0.09	BAUBILLIER	82B	HBC	0 $8.25 K^- p \rightarrow N K_S^0 \pi \pi$
0.39 ± 0.03	DAUM	81C	CNTR	63 $K^- p \rightarrow K^- 2\pi p$

WEIGHTED AVERAGE
0.354±0.033 (Error scaled by 1.4)



$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$

$\Gamma(K\omega)/\Gamma(K^*(892)\pi)$

Γ_5/Γ_2

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.118±0.034 OUR FIT				
0.10 ±0.04	FIELD	67	HBC	– $3.8 K^- p$

$\Gamma(K\eta)/\Gamma(K^*(892)\pi)$

Γ_7/Γ_2

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.006^{+0.014}_{-0.004} OUR FIT	Error includes scale factor of 1.2.			
0.07 ±0.04	FIELD	67	HBC	– $3.8 K^- p$

$\Gamma(K\eta)/\Gamma(K\pi)$

Γ_7/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
0.0030^{+0.0068}_{-0.0020} OUR FIT	Error includes scale factor of 1.3.				
0 ±0.0056	13	ASTON	88B	LASS	– $11 K^- p \rightarrow K^- \eta p$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.04	95	AGUILAR-...	71B	HBC	3.9,4.6 $K^- p$
<0.065	14	BASSOMPIE...	69	HBC	5.0 $K^+ p$
<0.02		BISHOP	69	HBC	3.5 $K^+ p$

$\Gamma(K^*(892)\pi\pi)/\Gamma_{\text{total}}$ Γ_3/Γ

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.134±0.022 OUR FIT				
0.12 ±0.04	15 GOLDBERG	76	HBC	– $3 K^- p \rightarrow p\bar{K}^0\pi\pi\pi$

$\Gamma(K^*(892)\pi\pi)/\Gamma(K\pi)$ Γ_3/Γ_1

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.27±0.05 OUR FIT				
0.21±0.08	14,15 JONGEJANS	78	HBC	– $4 K^- p \rightarrow p\bar{K}^0\pi\pi\pi$

$\Gamma(K\omega\pi)/\Gamma_{\text{total}}$ Γ_8/Γ

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.72	95	0	JONGEJANS	78	HBC $4 K^- p \rightarrow p\bar{K}^0 4\pi$

12 From phase shift analysis.

13 ASTON 88B quote < 0.0092 at CL=95%. We convert this to a central value and 1 sigma error in order to be able to use it in our constrained fit.

14 Restated by us.

15 Assuming $\pi\pi$ system has isospin 1, which is supported by the data.

$K_2^*(1430)$ REFERENCES

ALAVI-HARATI 02B	PRL 89 072001	A. Alavi-Harati <i>et al.</i>	(FNAL KTeV Collab.)
BIRD 89	SLAC-332	P.F. Bird	(SLAC)
ASTON 88	NP B296 493	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
ASTON 88B	PL B201 169	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
ASTON 87	NP B292 693	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
CARLSMITH 87	PR D36 3502	D. Carlsmith <i>et al.</i>	(EFI, SACL)
ASTON 84B	NP B247 261	D. Aston <i>et al.</i>	(SLAC, CARL, OTTA)
BAUBILLIER 84B	ZPHY C26 37	M. Baubillier <i>et al.</i>	(BIRM, CERN, GLAS+)
BAUBILLIER 82B	NP B202 21	M. Baubillier <i>et al.</i>	(BIRM, CERN, GLAS+)
CIHANGIR 82	PL 117B 123	S. Cihangir <i>et al.</i>	(FNAL, MINN, ROCH)
CLELAND 82	NP B208 189	W.E. Cleland <i>et al.</i>	(DURH, GEVA, LAUS+)
ASTON 81C	PL 106B 235	D. Aston <i>et al.</i>	(SLAC, CARL, OTTA) JP
DAUM 81C	NP B187 1	C. Daum <i>et al.</i>	(AMST, CERN, CRAC, MPIM+)
TOAFF 81	PR D23 1500	S. Toaff <i>et al.</i>	(ANL, KANS)
ETKIN 80	PR D22 42	A. Etkin <i>et al.</i>	(BNL, CUNY) JP
ESTABROOKS 78	NP B133 490	P.G. Estabrooks <i>et al.</i>	(MCGI, CARL, DURH+)
Also	PR D17 658	P.G. Estabrooks <i>et al.</i>	(MCGI, CARL, DURH+)
JONGEJANS 78	NP B139 383	B. Jongejans <i>et al.</i>	(ZEEM, CERN, NIJM+)
MARTIN 78	NP B134 392	A.D. Martin <i>et al.</i>	(DURH, GEVA)
BOWLER 77	NP B126 31	M.G. Bowler <i>et al.</i>	(OXF)
GOLDBERG 76	LNC 17 253	J. Goldberg	(HAIF)
HENDRICK 76	NP B112 189	K. Hendrickx <i>et al.</i>	(MONS, SACL, PARIS+) JP
LAUSCHER 75	NP B86 189	P. Lauscher <i>et al.</i>	(ABCLV Collab.) JP
MCCUBBIN 75	NP B86 13	N.A. McCubbin, L. Lyons	(OXF)
DEHM 74	NP B75 47	G. Dehm <i>et al.</i>	(MPIM, BRUX, MONS, CERN)
LINGLIN 73	NP B55 408	D. Linglin	(CERN)
AGUILAR-...	71B PR D4 2583	M. Aguilar-Benitez, R.L. Eisner, J.B. Kinson	(BNL)
BARNHAM 71C	NP B28 171	K.W.J. Barnham <i>et al.</i>	(BIRM, GLAS)
CORDS 71	PR D4 1974	D. Cords <i>et al.</i>	(PURD, UCD, IUPU)
BASSOMPIERRE... 69	NP B13 189	G. Bassompierre <i>et al.</i>	(CERN, BRUX) JP

BISHOP	69	NP B9 403	J.M. Bishop <i>et al.</i>	(WISC)
CRENNELL	69D	PRL 22 487	D.J. Crennell <i>et al.</i>	(BNL)
DAVIS	69	PRL 23 1071	P.J. Davis <i>et al.</i>	(LRL)
LIND	69	NP B14 1	V.G. Lind <i>et al.</i>	(LRL) JP
SCHWEINGRUBER	68	PR 166 1317	F. Schweingruber <i>et al.</i>	(ANL, NWES)
Also		Thesis	F.L. Schweingruber	(NWES, NWES)
BASSANO	67	PRL 19 968	D. Bassano <i>et al.</i>	(BNL, SYRA)
FIELD	67	PL 24B 638	J.H. Field <i>et al.</i>	(UCSD)
BADIER	65C	PL 19 612	J. Badier <i>et al.</i>	(EPOL, SACL, AMST)

OTHER RELATED PAPERS

ABLIKIM	05Q	PR D72 092002	M. Ablikim <i>et al.</i>	(BES Collab.)
AUBERT,B	04O	PR D70 091103R	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04P	PR D70 092001	B. Aubert <i>et al.</i>	(BABAR Collab.)
VANBEVEREN	01B	EPJ C22 493	E. van Beveren	
BARBERIS	98E	PL B436 204	D. Barberis <i>et al.</i>	(Omega Expt.)
ATKINSON	86	ZPHY C30 521	M. Atkinson <i>et al.</i>	(BONN, CERN, GLAS+)
BAUBILLIER	82B	NP B202 21	M. Baubillier <i>et al.</i>	(BIRM, CERN, GLAS+)
CHUNG	65	PRL 15 325	S.U. Chung <i>et al.</i>	(LRL)
FOCARDI	65	PL 16 351	S. Focardi <i>et al.</i>	(BGNA, SACL)
HAQUE	65	PL 14 338	N. Haque <i>et al.</i>	
HARDY	65	PRL 14 401	L.M. Hardy <i>et al.</i>	(LRL)
